

Question: Explain the mechanism of Fiber Optic Cable for signal. Explain its construction.

Answer:

Fiber optic glass/cable are strands of glass as thin as a hair used to transmit information over long distances. As the light remains entrapped within the wall without escaping, the information is transmitted without any loss. This enable to get information from those areas that are otherwise inaccessible.

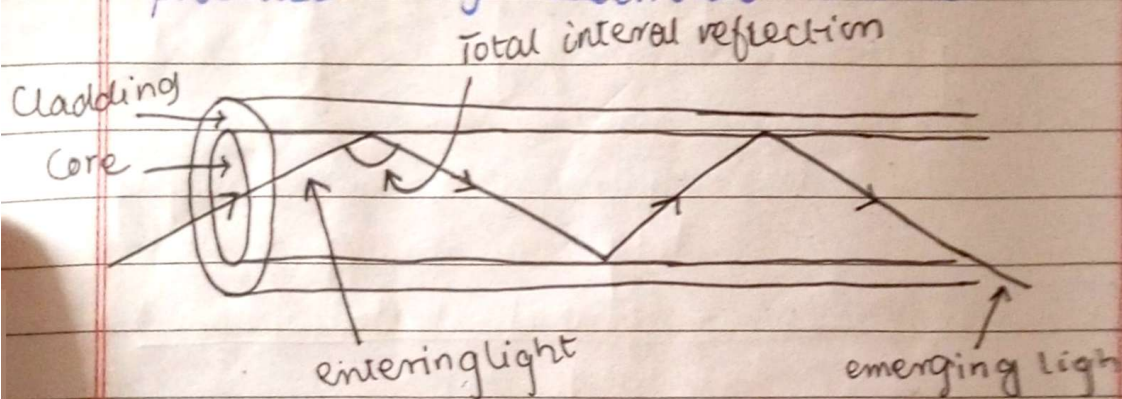
Mechanism of Fiber Optic Cable

(a) Transmission of light through Total internal reflection.

Fiber optic cables operate by transmitting data as light signals.

At the core of this technology is the phenomenon of total internal reflection. This occurs when light enters from a certain angle (less than 42°) in the fiber, and instead of refracting, reflects back into the fiber.

In this way it remains confined within the ~~the~~ core and able to travel long distances. A light source such as LED, sends light pulses down the fiber, each pulse representing a bit of data. As these light beams travel down to other end, there they are received by photodetectors. These photodetectors convert the light pulses back into electrical signals, ready to be processed by electronic devices.



Construction of Fiber optic cable

(a) Core

Core is the central part of fiber.

It is made of high quality silica glass or plastic and has a diameter ranging between 8 and 62.5 micrometers.

It has a relatively high refractive index.

(iv) Cladding:

It is also made of glass or plastic but with a relatively lower refractive index as compared to Core. Cladding surrounds core from outside and prevents light from escaping.

(v) Buffer Coating:

Buffer coating surrounds the cladding to protect it from moisture and physical damage. It is made of material like acrylate or polyimide.

Conclusion

In conclusion, fiber optic cables represent a pinnacle of modern communication technology, offering unparalleled speed, reliability and security. By utilizing the principle of total internal reflection, these cables efficiently transmit the data as light signals over vast distances with minimum loss.